PROCESS CHEESE SPREADS

NEEDS/FUNCTIONALITY

Process cheese products are typically made by combining particulated natural cheeses with emulsifiers, skim milk, whey powder, acid, salt, color and flavor. The word 'process' refers to the use of emulsifying salts, as defined by the U.S. Code of Federal Regulations.

Some of the most typical problems encountered are: (1) emulsion breakdown resulting in water loss, (2) poor melt characteristics, (3) poor grating and slicing of process cheese loafs, and (4) unappealing texture and mouth-feel.

CHEESE SPREAD TEXTURIZERS CAN:

For Cheese Loaf

- Stabilize emulsions
- Allow more water in final product
- Contol melting properties
- Reduce stickiness
- Provide smooth & creamy mouth-feel and body

For Mozzarella

- Maintain texture
- Allow more water in final product
- Allow production from fresh curd
- Provide stretch & stringiness

For Cheese Spreads

- Stabilize emulsion
- Allow high water content
- Provide hot or cold spreadability
- Provide mouth-feel
- Lengthen shelf-life

PRODUCTS OF CHOICE

Products	Type	Comments
Textureze PC series	Texture Systems, often co-processed, consisting of a variety of hydrocolloids and stabilizers	Optimized for synergy and value. Contact ISP for recommendations on the system best suited to your needs
Customized systems, often co-	Premixes of hydrocolloids and other	ISP's technical team will work with you to help develop an

processed for synergy	ingredients	optimized, cost-effective texturant system meeting your unique requirements
Textureze UB 100, 110, 120, 130	Texture Systems, often co-processed, consisting of a variety of hydrocolloids and stabilizers	Provide mouth-feel and texture to cheese spreads and other cheese products
Manucol DMF, Kelcosol	Sodium Alginates	Provide smooth & creamy mouth-feel

ASTARIS®
Quality Products. Exceptional Response.

Products

None Disodium Phosphate Anhydrous

Food Grade
Meets Food Chemicals Codex Specifications
CAS No. 7558-79-4

Formula	Na_2HPO_4 MW (mol): 142.0
Synonyms	Sodium phosphate, dibasic; DSP/A; disodium monohydrogen orthophospha monophosphate. Neutral sodium phosphate.
Description	White, odorless, free flowing powder; white, odorless, free flowing granules; granular product; white, free-flowing crystalline product.
Detailed Product Uses	Buffer, emulsifer, or texturizer for instant puddings, evaporated milk, proces cereals, precooked meats, pasta products, pharmaceuticals, laxatives, wate food processing.

KANSAS
DEPARTMENT of COMMERCE
Agriculture Marketing Division

Value-Added Dairy Processing Feasibility Report

"A Catalyst for Thought"

Ray Hammarlund, Cooperative Development Specialist
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July 2003

ICE CREAM

Ice cream and other frozen dairy products represent an extremely diverse variety of products. Ice cream is a frozen food made from a mixture of dairy products, such as milk, cream, and non-fat milk, combined with sugars, flavorings, fruits, nuts, etc. If the ice cream contains at least 1.4% egg yolk it is called French ice cream. Both regular ice cream and French ice cream must contain 10% milk fat and weigh at least 4.5 pounds of solids per gallon with a minimum of 1.6 pounds solids per gallon. Light ice cream has less than 50% of the fat of regular ice cream. Sherbet, both fruit sherbets and those with non-fruit flavors, contain between 1 and 2 percent milkfat and weigh not less than 6 pounds per gallon. Water ices are similar to sherbet but contain no dairy ingredients. Mellorine is a frozen desert similar to ice milk in which the milkfat is replaced, wholly or partially, with vegetable fat and the minimum fat content is 6%. (The Latest Scoop)

Basic Ice Cream Making

The basic mix for the manufacture of ice cream is cream and other milk ingredients, plus sweeteners. The ingredients of the mix are carefully blended in proper proportions in a mixing tank. The mix may also contain small amounts of functional ingredients, such as a stabilizer, which prevents the formation of ice crystals in the ice cream after it is frozen. (Table 4)

The mix then goes to a pasteurizer where it is heated and held at a pre-determined temperature for a specific time. The most common type of pasteurization is the high-temperature-short-time (HTST) method in which the mix is heated to 175 degrees F and held for 25 seconds.

The hot mix then goes to the homogenizer where, under pressure of 2,000 to 2,500 pounds per square inch, the milkfat globules are broken down into still smaller particles to help make the ice cream smooth.

After homogenization, the hot mix is quickly cooled to a temperature of about 40 degrees F. Next, freezing of the mix is accomplished by one of two methods: a "continuous freezer," which uses a steady flow of mix; or a "batch freezer," which makes a single quantity of ice cream at a time.

Table 4

Typical ice cream formulas

Type of ice cream	Fat % wt	MSNF % wt	Sugar % wt	E/S % wt	Water % wt	Overrun % vol
Dessert ice	15	10	15	0.3	59.7	110
Ice cream	10	11	14	0.4	64.6	100
Milk ice	4	12	13	0.6	70.4	85
Sherbert	2	4	22	0.4	71.6	50
Water ice	0	0	22	0.2	77.8	0

Fat:	Milk, cream, butter or vegetable fat
Water:	May include flavoring or coloring matter
MSNF:	Milk solids-non-fat (protein, salts, lactose)
Sugar:	Liquid or solid sucrose (10% of sugar may be glucose or non-sugar sweetener)
E/S:	Emulsifier and stabilizer, e.g. monoglycerides, gelatin, alginate
Overrun:	Amount of air in product
Other ingredients:	Egg, fruit and chocolate pieces may be added during processing.

- **C. Blue Cheese**

Introduction

The origin of mould ripened cheese is lost in antiquity. It was made in France at least as early as the Roman era. The name" Roquefort" first appeared in the year 1070. Roquefort cheese is made from ewes' milk, and the trade name is protected throughout the world. Other cheese varieties that are ripened by the mould *Penicillium roqueforti* include Blue (Bleu, Blue-veined), Gorgonzola (Italy), Stilton, Wensleydale and Dorset Blue (Blue Vinncy) of England, Niva of Czechoslovakia, Danablu and Mycella of Denmark, Nuworld, U.S. and Ermite, Canada. *P. roqueforti* has been known by other names such as *P. glaucum, P. gorgonzola* and *P. stilton.* A white mutant of *P. roqueforti* was developed by Knight of Wisconsin and the resulting cheese is called Nuworld.

Standards: 47% moisture; 27% fat. In practice, the fat content is usually higher.

Procedure

1. Pasteurize milk. P/F ratio of about 0.87 is desirable. Milk may also be homogenized before pasteurization to promote lipolysis in the cheese. If the milk is not homogenized, add 30 g lipase per 1,000 kg of milk. If the milk is highly coloured, 0.03 - 0.04% titanium dioxide diluted with 10x its weight of warm water may be added to the milk before renneting, to prevent green cheese.

2. Add 3% mesophilic lactic starter and ripen for about an hour at 32C until TA increases by at least 0.05% and pH is 6.6 - 6.5

3. Measure 200 ml rennet per 1,000 kg milk (dilute rennet about 20 times with water and add to the milk). Setting will occur in 20 - 30 min. but do not cut until 1 hr. after renneting.

4. Cut curd with Omega" (12.8 mm knives). Allow curd to settle for 10 min. then agitate gently to prevent matting. When the acidity is 0.02% above cutting acid (about 80 min. after cutting) push curd away from the gate and allow it to settle for 10 min.

> [Feta cheese can be made from the same vat as Blue cheese, by dipping some of the curd and whey into rectangular forms when the acidity is about .01% above cutting acid (20-40 min after cutting), and then proceeding from Step 7 in the Feta procedure above. Similarly, Camembert cheese can be made by removing some curd and whey at 45 - 60 minutes after cutting and proceeding from Step 5 in the Camembert procedure above.]

5. Remove whey to the level of the curd. Break up curd and remove remaining whey. Ditch curd and turn over after 10 min. After an additional 10 min. break up the curd to prepare for salting.

6. Add salt, 1% of weight of curd. Sprinkle blue mould powder (*Penicillium roqueforti* over all the curd. It should look like well peppered scrambled eggs. Mix the mold powder thoroughly, and then place curd in cylindrical hoops on a drain table. Be certain that blue cheese is kept well apart from other cheeses in the make room.

7. Turn cheese 5 - 10 min. after filling and then at 30 min. intervals for 2 Omega hrs. Cover with broad cloth and incubate overnight at room temperature for 16 - 20 h or until cheese pH is 4.5 - 4.7.

8. Weigh sufficient salt to provide 50 g of salt per kg of cheese. Salt the cheese by rubbing the salt on all

surfaces. Store the cheese at 85% RH and 12 - 14C for 24 h, or place the cheese on plastic mats in large plastic tubs with the lids partially open to allow some drying off of the cheese, and store at 12 - 13C for 24 h.

9. If desired, the cheese can be treated with paraffin (waxed) before skewering and ripening. Alternatively, the cheese may be turned and brushed regularly while curing (Step 11) to encourage development of smear on the surface.

10. Put about 60 holes on both sides of each cheese with a 3 mm diameter skewer.

11. Store the cheese at 95% RH and 12 - 14C for 6 - 8 weeks. Alternatively, the cheese can be placed on plastic mats in large plastic tubs with the lids slightly open to allow some oxygen entry for mould growth, and ripened at 12 - 14C. Turn every day for several days and then turn once a week. The pH should increase to 6.0 - 6.25 after 8 weeks.

12. Vacuum pack and store at 7C until consumed (up to 3 months).

Curing

Few lactic starter bacteria survive the first few weeks of curing due to acid and salt inhibition. *P. roqueforti* becomes evident 8 - 10 days after pricking. This mould grows well because it is more tolerant of salt and low oxygen than other moulds. The smear which forms on the surface is due to *B. linens* or *B. erythrogenes*. Too much smear is undesirable.

Activities of mould lipases and added lipases produce butyric, caproic, caprylic, capric and higher fatty acids. A predominant flavour compound is methyl-n-amyl Ketone (heptanone 2).

Caprylic acid $CH_3(CH_2)_6.COOH$

Methyl-n-amyl Ketone $CH_3(CH_2)_4.COCH_3$

Cooking Terms

Homogenize---To break up fat globules into small particles, generally referring to milk

Homogenize - To create an emulsion by reducing all the particles to the same size. In milk and salad dressing the fat globules are mechanically broken down until they are evenly distributed throughout the liquid.

PFIZER CHEESE MONOGRAPHS · VOLUME III

COTTAGE CHEESE AND OTHER CULTURED MILK PRODUCTS

BY

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AND

STEWART L. TUCKEY, PH.D.

CHAS. PFIZER & CO., INC. · NEW YORK, NEW YORK

acidifying agents. With starters of uniform activity, the rate of acid development should be fairly uniform during cooking; hence strict adherence to a suitable uniform cooking schedule and selection of the optimum cutting acidity should give adequate control. Some plants may experience difficulty in controlling acid development. Unsatisfactory vats, for example, necessitate very slow cooking to prevent matting and mealy curd. Also, starters differ sometimes in the rate at which they produce acid in the pH or acidity range (4.8—4.5) in which curd is cooked; thus some plants on a starter rotation program, or which change starters frequently, may find it easier to adjust pH or acidity rather than change cooking schedules. In such cases, food-grade sodium hydroxide, dissolved in water, may be added to the whey; other neutralizing agents or buffer salts may be used. Additions should be small, resulting in changes of 0.05 pH units or 0.02% titratable acidity, and should be distributed evenly throughout the vat; several additions are better than one large one. It should be remembered that there is considerable acid or buffer capacity in the curd, and that final estimates of the change in the pH or acidity of the whey should be made 15 to 20 minutes after adding the neutralizing agent.

The chief reason for cooking cottage cheese is to facilitate the removal of whey and the firming of the curd. As the temperature is raised, more whey is expelled and the resulting curd is firmer. Lundstedt (49) found that most of the increase in firmness occurred during the first 15 to 30 minutes of holding at any given temperature and that firmness did not increase appreciably after that. He postulated a "critical cooking temperature" for each vat of cheese, or, a temperature to which a vat of curd should be raised slowly and at which it would achieve the desired firmness during 30 minutes of holding. Lundstedt stated that the critical cooking temperature varied from plant to plant depending on the type of milk, temperature of pasteurization, size of vat, size of curd particles, amount of milk in the vat, pH of the curd at cutting, the amount of casein in the skim milk,

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